

July 12, 2004

NRC 2004-0072
10 CFR 50.73

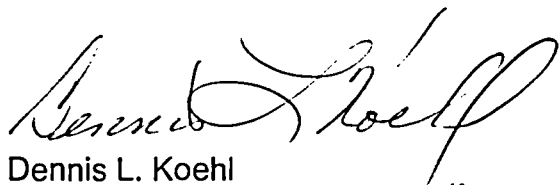
U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington DC 20555

Point Beach Nuclear Plant Unit 2
Docket 50-301
License No. DPR-27

Licensee Event Report 301/2004-002-00
Concerns With Diver Safety Results in Manual Reactor Trip

Enclosed is Licensee Event Report (LER) 301/2004-002-00 for the Point Beach Nuclear Plant Unit 2. This LER describes the conditions that led to the manual trip of the Unit 2 reactor as a result of concerns for the safety of a diver inspecting the circulating water intake structure. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A).

This submittal contains no new regulatory commitments and no revisions to existing commitments.



Dennis L. Koehl
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE 1

LER 301/2004-002-00

CONCERNS WITH DIVER SAFETY RESULTS IN MANUAL REACTOR TRIP

5 pages follow

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to: bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

FACILITY NAME (1)

POINT BEACH NUCLEAR PLANT UNIT 2

DOCKET NUMBER (2)

05000301

PAGE (3)

1

OF 5

TITLE (4)

CONCERNS WITH DIVER SAFETY RESULTS IN MANUAL REACTOR TRIP

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	15	2004	2004	- 002	- 00	07	12	2004	FACILITY NAME	DOCKET NUMBER
										05000
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR *: [Check all that apply] (11)							
POWER LEVEL (10)		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)		X	50.73(a)(2)(iv)(A)	73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)	OTHER
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	Specify in Abstract below or in
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)	NRC Form 366A
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)	
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)	
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

Charles Wm. Krause, Senior Regulatory Compliance Engineer

TELEPHONE NUMBER (Include Area Code)

(920) 755-6809

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTORER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTORER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 15, 2004, a manual trip of the Point Beach Nuclear Plant (PBNP) Unit 2 was initiated when the control room was notified that a diver had become entangled in the intake structure for the circulating water (CW) system. While inspecting the intake structure for winter damage, the diver's tether, air and communication line became snagged. The diver's line tender, together with the assistance of a rescue diver, were unable to clear the lines. When communications with the diver were lost, the NMC diving liaison on the boat requested that the Unit 2 CW pumps be secured in order to facilitate removing the diver from the water. Securing the CW pumps requires that the reactor first be tripped. After the reactor trip and securing the CW pumps, both divers exited the water uninjured. Plant systems functioned as expected during the reactor trip transient, including the reactor protection and auxiliary feedwater systems. Since the circulating water system was secured, the main condensers were unavailable for decay heat removal. The steam generator atmospheric steam dump valves were used to remove decay heat. An incident investigation and root cause evaluation were conducted. The primary causes of this event were determined to be unclear and inconsistent communications and inadequate supervisory oversight. Process and procedural corrective actions are being completed. PBNP Unit 2 was returned to full load operations on May 20, 2004.

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Point Beach Nuclear Plant Unit 2	05000301	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		2004	- 002	- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Event Description:

On May 15, 2004, at approximately 11:54 AM (all times are CDT) a manual trip of the Point Beach Nuclear Plant (PBNP) Unit 2 reactor [EISS System Code: AB] was initiated when the control room [EISS System Code: NA] was notified that a diver had become entangled in the intake structure [EISS System Code: MD]. At the time, a diver was inspecting the circulating water (CW) [EISS System Code: NN] intake structure for winter damage. PBNP Unit 2 was operating at full load and Unit 1 was in a refueling outage. While inspecting the intake structure, the diver's tether, air and communication line became snagged. The diver's line tender, together with the assistance of a rescue diver, were unable to clear the lines. When the communications with the diver were lost, the NMC diving liaison on-board the dive boat requested that the Unit 2 CW system be secured in order to facilitate removing the diver from the water. Following the reactor trip, the Unit 2 CW pumps [EISS Component Code: P] were secured at 11:55 AM. Both divers were subsequently removed from the water uninjured.

Plant systems functioned as required and designed during the reactor trip transient. The reactor protection [EISS System Code: JC] and auxiliary feedwater [EISS System Code: BA] systems initiated as expected. There was no Emergency Core Cooling [EISS System Code: BQ] System actuation. Since the circulating water system was secured, the main condensers [EISS System Code: SG] were unavailable for decay heat removal as a result of the loss of condenser vacuum. The atmospheric steam dump valves [EISS Component Code: RV] were used to remove the decay heat from the steam generators [EISS Component Code: SG]. This event was determined to be reportable pursuant to 10 CFR 50.72(b)(2)(iv)(B) as any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical and 10 CFR 50.72(b)(3)(iv)(A) for a valid actuation of the auxiliary feedwater system. An event notification (EN# 40754) was completed to the NRC at 1412 CDT on May 15, 2004. PBNP Unit 2 was returned to full load operations on May 20, 2004.

Event Analysis:

The PBNP CW system circulates water from Lake Michigan through the main condensers. The PBNP CW intake system is common to both units, and is designed to provide a reliable supply of water to the suction of the four CW pumps, six service water pumps, and two fire water pumps. The intake structure, or crib, is located 1750 ft. from the shore in a water depth of about 22 ft. The structure consists of two annular rings of structural steel H piles. The annulus is filled with large limestone blocks. The structure has an outside diameter of 110 ft., an inside diameter of 60 ft. and a top elevation at approximately 11 ft. below the lake surface. Water enters the intake crib primarily through the 60 ft. opening above the intake cones. Water flows from the intake crib to the on shore pumphouse through two 14 ft. diameter, pipes buried below the lake bed. With two CW pumps in operation the total intake flow is approximately 365,000 gallons per minute. At the time of this event, Unit 2 was operating at 100% power with full flow through the Unit 2 intake pipe. There was no flow through the Unit 1 intake pipe. Estimated flow at the north intake cone edge was between

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6-7 ft./sec.

The purpose of the dive on May 15, 2004, was to inspect in detail the damage to the trash racks that cover the intake area. The damage had initially been identified during an earlier dive on May 13. The diving crew on May 15 included two boats, five divers, and a NMC diving liaison engineer. The first diver entered the water at about 1004 and began his inspection on the south half of the intake structure. At 1120 this diver began to inspect the north side of the intake from outside of the structure.

At 1125, the diver notified the boat that he could not see the top anchors on the north half of the intake and he would be entering the north side of the structure. The dive team member that was monitoring the video and diver communications paused, waiting for a comment or reaction from the NMC diving liaison. When the engineer did not make any comment or physical motion, the dive team member assumed that entering the north half of the intake structure was acceptable and he acknowledged to the diver that it was understood that the diver was entering the north half of the structure. Just prior to the time of this discussion between the boat crew and the diver, the NMC diving liaison received a return call from Site Engineering to discuss a message he had left earlier in the dive about the damage that had been observed at this point of the inspection. It is believed that he was on the phone or otherwise distracted when the diver entered the north side, as he does not remember hearing any conversation between the boat and the diver about entering the north side of the crib.

After entering the north side of the intake crib, the diver's air and communication lines were twice drawn into the intake bell of the Unit 2 intake pipe and then pulled free by the diver. Upon being drawn in a third time, the lines snagged on a pipe support for a chlorine injection line. Neither the diver nor the tender on the boat were able to free the line. A rescue diver then entered the water to help the first diver to free the line; however, he also was unable to untangle the line. The first diver ended up flattening himself on the lake bottom against the approximate 12" lip of the operating intake bell to avoid being drawn into the intake pipe. When the diver's communication line was lost due to fretting against the pipe support, the NMC diving liaison requested that the circulating water pumps be stopped. As noted previously, the Unit 2 reactor was manually tripped and the CW pumps secured. Once the pumps were stopped, the rescue diver was able to free the snagged line and both divers left the water under their own power. Neither diver required medical attention.

Safety Significance

This CW intake structure diving event was a matter of both industrial safety, for which a diver was placed in grave danger, and nuclear safety, as the plant was challenged by a manual trip of the reactor with a loss of normal heat removal. The increase in risk due to the plant trip was evaluated by considering the conditional core damage probability of a plant trip without the condenser but with main feedwater still available. Based on the Point Beach PRA model, the core damage

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probability for this scenario demonstrates that this plant trip event was of very low risk significance. NMC further concludes that at no time during this reactor trip and shutdown transient was there a loss of any system, structure or component safety function; therefore, this event did not constitute a safety system functional failure.

Cause:

An incident response team from the NMC fleet was formed on the afternoon of May 15 to provide an initial investigation into the issues that occurred during the diving activities, recommend immediate actions to implement barriers that would prevent such an event, and to create a time line of the event. These activities were concluded on May 17, 2004. Subsequently a Root Cause Evaluation (RCE) team was appointed to determine the Organizational and/or Programmatic issues as well as the human performance issues that lead or contributed to this significant near miss. The RCE team was also tasked with making recommendations for correcting the problems identified and preventing recurrence. The RCE report concluded that the root and contributing causes of the event included the following:

Complacency/Overconfidence: Plant personnel and the dive crew treat diving operations as a routine job. No heightened or special awareness had been accorded diving operations.

Communication: Communications were unclear and inconsistent throughout the entire diving evolution leading to the plant personnel, the NMC diving liaison, and the dive crew not being aligned on expectations and requirements and consistent understanding of the dive scope and specifically where the divers were located.

Procedure Use and Content: The procedure directing the intake crib inspection was not followed at all times and was determined to be unclear. The pre-dive checklist from this procedure was not completed for this dive.

Management and Supervisory Oversight: There was little or no Management oversight for the diving operation. Supervisory oversight was not adequate.

Dive Crew Line Tending: Although it is understood that boat movement impacts line tending, the video tape of the dive clearly shows several instances of excessive slack in the diver's tending lines.

Corrective Action Less Than Adequate: Some elements of this event were present in the October, 2000 diving event at PBNP (LER 266/2000-010-00) which also involved a reactor trip due to concerns for diver safety while inspecting the pump house structure.

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Corrective Action:

Corrective actions to address this event and actions to prevent reoccurrence of diving related events include:

- Diving operations were immediately suspended. Procedures were revised to require the authorization of the PBNP plant manager to conduct a diving evolution.
- Supervisory oversight issues were addressed through application of the disciplinary action process.
- An interim diving program will be developed to establish a dive approval protocol involving the appropriate levels of management. This program will require that a NMC "dive liaison" is continuously present at the dive with a clear priority for the safety of the divers. A diving program owner will be assigned from the plant maintenance group. Existing diving operation procedures and the diving services contract will be revised to include the elements of this interim program.
- In the longer term, PBNP will be working with the NMC Fleet to develop and implement an industry standard diving program.

Corrective actions have been entered in the PBNP corrective action program (CAP) and will be tracked to completion in accordance with the CAP process and procedures.

Previous Similar Events:

A review of recent LERs identified the following event which resulted in a manual reactor trip due to concerns with diver safety.

LER NUMBER**Title**

266/2000-010-00

Manual Reactor Trip Due to Concerns For Diver Safety